Step **31**: At this step, the actuator **12** is at the optimal implant location, the tissue height has been referenced and the laser ranging sub-system **30** has a measure of the dynamic distance from the tissue surface **32** to the tip **26** of the device **14** to be implanted, based on the motion of the tissue surface **32** due to pulsatile and respiratory motions

Step **32**: The surgeon or processor **40** initiates the implantation procedure and the actuator **12** moves toward the tissue surface **32** at a predefined speed that incorporates the dynamic motion of the tissue.

Step **33**A: The contact sensor **16** detects contact and signals the processor **40**.

Step **33**B: The load cell **20** detects the force the tissue is exerting on the device **14** during implantation and signals the processor **40**.

Step **34**A: The processor **40** compares the actual distance the actuator **12** travelled when contact was detected to the expected value based on the tissue reference height and the length D_2 of the device **14** to be implanted.

Step **34**B: The processor **40** compares the actual force on the device **14** being implanted to the expected force.

Step **35**: The processor **40** adjusts the speed of the actuator **12** and the remaining distance it will travel to reach the implantation depth based on the output of Step **34**A and **34**B.

Step **36**: The final travel distance of the actuator **12**, the contact height and the load cell output are stored in memory **42** for diagnostic purposes.

Step **37**: Once implantation is completed, the clamp mechanism **18** releases the clamping surface **22** and the actuator **12** retracts to its home position in anticipation of the next device **14** being used.

Another embodiment of the invention monitors body function and movement (e.g., breathing, pulse, muscle twitching or spasms, etc.) of the patient and the target tissue's relative movement to the device **14** as a function of the body function and movement. The aforementioned sub-systems (laser ranging sub-system **30**, imaging sub-system **28**) of the apparatus **10** can be used as monitors, but any commercially available component that performs such monitoring tasks is acceptable. The processor **40** will analyze the body functions and movements to generate a dynamic system equation or equations to synchronize the actuation of the actuator **12** for placement of the device **14** into the tissue.

While the disclosure has been described in detail and with reference to specific embodiments thereof, it will be apparent to one skilled in the art that various changes and modifications can be made therein without departing from the spirit and scope of the embodiments. Thus, it is intended that the present disclosure cover the modifications and variations of this disclosure provided they come within the scope of the appended claims and their equivalents.

What is claimed is:

1. A method to insert a device into tissue of a patient, the method comprising the steps of:

a. loading the device for implantation into a clamping mechanism connected to an actuator, wherein the device comprises one or more implantation shanks that will form one or more implantation sites on the tissue when implanted into the tissue;

b. referencing a position of the device with respect to the actuator;

c. locating an implantation vicinity of the tissue;

d. identifying an initial implantation location within the implantation vicinity;

e. capturing a raw image of a field of view of the implantation vicinity, wherein the initial implantation location is contained within the field of view;

f. referencing a surface of the tissue in the field of view with respect to the actuator;

g. analyzing a portion of the raw image containing the initial implantation location to generate a map of sensitive structures in the tissue that could be damaged by the one or more implantation shanks of the device at the initial implantation sites during implantation to form one or more initial implantation sites;

h. comparing the one or more initial implantation sites of the device with the map of the sensitive structures in the tissue to determine severity of damage to the tissue;

i. virtually reorienting the one or more initial implantation sites to one or more subsequent implantation sites to form a subsequent implantation location;

j. comparing the one or more subsequent implantation sites of the device with the map of the sensitive structures in the tissue to determine severity of damage to the tissue;

k. repeating steps i and j until every horizontal and angular position in the field of view has a computed severity of damage to form a plurality of severity of damage calculations;

l. identifying an optimal implantation location from the plurality of severity of damage calculations;

m. adjusting the device to the optimal implantation location;

n. actuating the device to be implanted along a single, longitudinal axis toward the optimal implantation location through a distance that is determined based on a depth of the device in the tissue and the instantaneous distance between the actuator and the surface of the tissue;

o. detecting an actual point and an actual time of contact between the surface of the tissue and the device;

p. applying an adjustment to the distance the actuator will travel and a speed it is travelling based on a comparison of an expected point and an expected time of contact calculated using the referenced positions of the actuator and the tissue surface and a programmed speed of the actuator and the actual point and the actual time of contact measured during the implantation;

q. measuring a force between the device and the surface of the tissue during implantation;

r. applying an adjustment to the distance the actuator will travel and the speed the actuator is travelling based on a comparison of an expected force during implantation based on experimental data for the tissue into which the device is being implanted and the actual force measured during implantation of the device;

s. releasing the device that was implanted after it has reached its target depth in the tissue by retracting the clamping surfaces from the device;

t. retracting the actuator; and

u. recording data that was collected during implantation of the device so it can be used for diagnostic purposes.

2. The method according to claim **1**, further comprising the step of oscillating the device being implanted in a first direction coincident with the single, longitudinal axis and a second direction normal/transverse to the single, longitudinal axis during implantation of the device into the tissue, wherein a first and a second direction oscillating frequencies are based on experimentally determined force reduction for the tissue into which the device is being implanted.

3. An apparatus to insert a device into a soft tissue of a patient, the apparatus comprising:

an assembly of a clamping mechanism for retaining the device, wherein the assembly comprises an actuator for opening and closing a clamp having two opposing